

Appl. No. 10/032,698  
Amdt. dated September 29, 2004  
Amendment under 37 CFR 1.116 Expedited Procedure  
Examining Group 2874

PATENT

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1. (Currently amended) A room temperature nanowire switching device comprising:
  - a nanowire structure comprising an elongated member having a cross-sectional diameter ranging from about 1 nanometers but less than about 300 nanometers;
  - a first terminal coupled to a first portion of the nanowire structure;
  - a second terminal coupled to a second portion of the nanowire structure, the second portion of the nanowire structure being disposed spatially from the first portion of the nanowire structure; and
  - an active surface structure comprising a first chemical species coupled to the nanowire structure, the active surface structure extending from the first portion to the second portion along the elongated member[.,,];

\_\_\_\_\_whereupon the nanowire structure has a first conductivity value as measured between the first terminal and the second terminal while the active surface is subjected to a first intensity of electro-magnetic radiation illumination, the nanowire structure having a second conductivity value as measured between the first terminal and the second terminal while the active surface is subjected to a second intensity of electro-magnetic radiation illumination[.,,];

\_\_\_\_\_wherein the electro-magnetic radiation illumination releases a portion of the first chemical species from the active surface structure;

wherein the first chemical species can be selected from O<sub>2</sub>, NO<sub>2</sub>, H<sub>2</sub>O, NO, and SO<sub>2</sub>; and

wherein the device is operable at room temperature.
2. (Currently amended) The device of claim 1 wherein the device is at least one of a switch, a sensor, a chemical sensor, photo-detector, an opto-electronic device, MEMS, and MBOMS.

Appl. No. 10/032,698  
Amdt. dated September 29, 2004  
Amendment under 37 CFR 1.116 Expedited Procedure  
Examining Group 2874

PATENT

3. (Original) The device of claim 1 wherein the device is a humidity sensor or an oxygen sensor.
4. (Original) The device of claim 1 wherein the nanowire structure is characterized by a shape of a nanowire.
5. (Original) The device of claim 1 wherein the active surface is about 10% to 90% of a total surface area of the nanowire structure.
6. (Original) The device of claim 1 wherein the cross-sectional diameter ranges from about 1 nm to 500 nm.
7. (Original) The device of claim 1 wherein the nanowire structure has an aspect ratio (length to diameter) of 10 to 1000.
8. (Original) The device of claim 1 wherein the nanowire is made of a material that substantially single crystal.
9. (Original) The device of claim 1 wherein the nanowire is made of a material that is polycrystalline.
10. (Original) The device of claim 1 wherein the nanowire structure is made of a material that is a semiconductor.
11. (Original) The device of claim 10 wherein the semiconductor material is ZnO, SiGe, Si, Ge, SnO<sub>2</sub>, GaN, PbSe, PbS, or Bi<sub>2</sub>Te<sub>3</sub>.
12. (Original) The device of claim 1 wherein nanowire structure comprises at least a first material and a second material that are spatially separated from each other.
13. (Original) The device of claim 1 wherein the nanowire structure is made of a homogeneous material.

Appl. No. 10/032,698  
Amdt. dated September 29, 2004  
Amendment under 37 CFR 1.116 Expedited Procedure  
Examining Group 2874

PATENT

14. (Original) The device of claim 1 wherein the nanowire is heterogeneous in texture.

15. (Previously presented) The device of claim 1 wherein the second intensity level of the illumination being proportional to the second conductivity value.

16. (Canceled)

17. (Original) The device of claim 1 wherein the device is substantially free from high temperature thermal elements.

18. (Original) The device of claim 1 wherein the device is operable at 0 to 100 Degrees Celsius.

19. (Currently amended) A method for switching an opto-electronic device, the method comprising:

providing a nanowire structure having a surface region, the surface region having a first chemical species attached to the surface region of the nanowire structure, the nanowire structure having the first chemical species providing a first electrical state of the nanowire structure; and

illuminating energy onto the surface area of the nanowire structure to change the nanowire structure having the first chemical species from the first electrical state to a second electrical state whereupon the second electrical state allows a conduction characteristic of the nanowire to change from the first electrical state to the second electrical state[.,.];

wherein the illuminating releases a portion of the first chemical species from the surface area of the nanowire structure; and

wherein the first chemical species can be selected from O<sub>2</sub>, NO<sub>2</sub>, H<sub>2</sub>O, NO, and SO<sub>2</sub>.

20. (Canceled)

Appl. No. 10/032,698  
Amdt. dated September 29, 2004  
Amendment under 37 CFR 1.116 Expedited Procedure  
Examining Group 2874

PATENT

21. (Original) The method of claim 19 wherein the illuminating converts the first chemical species into the second chemical species.

22. (Canceled)

23. (Original) The method of claim 19 wherein the energy is electro-magnetic radiation.

24. (Original) The method of claim 19 wherein the nanowire structure is made of a semiconductor material.

25. (Currently amended) The method of claim 24 wherein the semiconductor material is selected from [[is]] ZnO, SiGe, Si, Ge, SnO<sub>2</sub>, TiO<sub>2</sub>, [[or]] and GaN.

26. (Original) The method of claim 19 wherein the nanowire structure is single crystalline or polycrystalline.

27. (Currently amended) A nanowire opto-electronic switching device comprising:

a nanowire structure comprising an elongated member having a cross-sectional diameter ranging from about 1 nanometers but less than about 300 nanometers;

a first terminal coupled to a first portion of the nanowire structure;

a second terminal coupled to a second portion of the nanowire structure, the second portion of the nanowire structure being disposed spatially from the first portion of the nanowire structure; and

an active surface structure comprising a first chemical species coupled to the nanowire structure, the active surface structure extending from the first portion to the second portion along the elongated member[[.]];

\_\_\_\_\_whereupon the nanowire structure has a first resistance value as measured between the first terminal and the second terminal while the active surface is subjected to a first level of electro-magnetic radiation, the nanowire structure having a second resistance value as

Appl. No. 10/032,698

PATENT

Amdt. dated September 29, 2004

Amendment under 37 CFR 1.116 Expedited Procedure

Examining Group 2874

measured between the first terminal and the second terminal while the active surface is subjected to a second level of electro-magnetic radiation[[,]];

\_\_\_\_\_ wherein the release of a portion of the first chemical species from the active surface structure varies with the intensity of electro-magnetic radiation from the first level of electro-magnetic radiation and the second level of electro-magnetic radiation;

wherein the first chemical species can be selected from O<sub>2</sub>, NO<sub>2</sub>, H<sub>2</sub>O, NO, and SO<sub>2</sub>; and

wherein the device is operable at room temperature.